Plan of Action 2010-2013

Juanjo Dañobeitia
UTM-CSIC

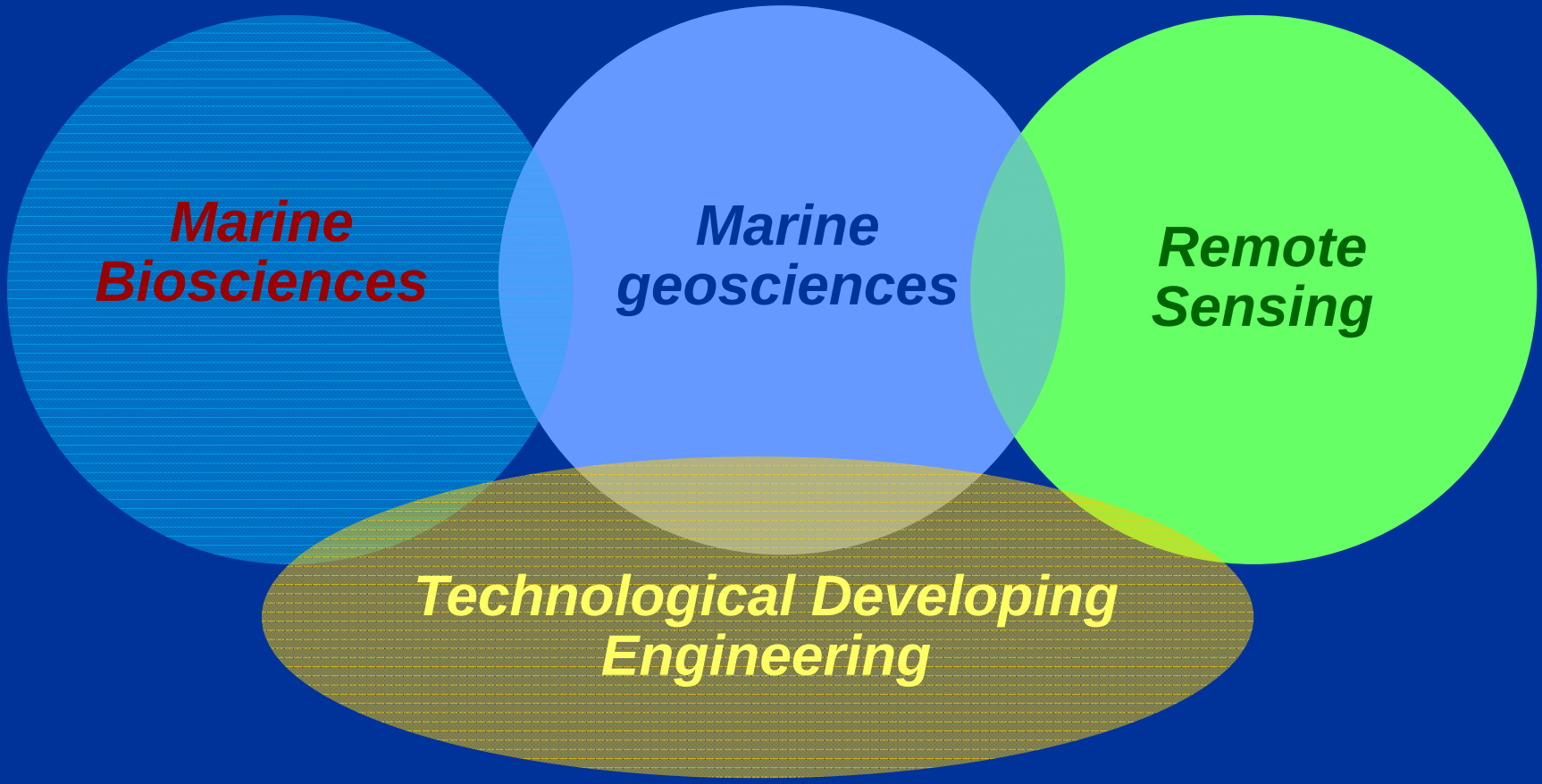
OBS Meeting, Barcelona, 20 Sep 2010

CSIC

GOBIERNO DE ESPAÑA

MINISTERIO DE CIENCIA E INNOVACIÓN

4.- Research lines (R+D+i)



4.- R&D in Marine Geosciences Line: Objectives

1. ***Contribute to the development of the existing geo-scientific marine instrumentation managed by UTM-CSIC** (specially seismic/acoustic systems and ocean bottom sensors/observatories). Optimizing the instruments assessing technicians and researchers alike.*

2. ***Find new scientific applications for the "conventional" existing marine geosciences instrumentation**, and exploring the potential of new instrumentation to be used for the national marine geoscientific community*

3. ***Verify and test technological innovations in geo-scientific applications,** in the particular topics of seafloor mapping, structure, nature and properties of sub-seafloor rocks and sediments, seismic oceanography, geohazards and long-term monitoring from seafloor observatories / sea bottom sensors.*

4. ***Detect lacks and weakness in the marine geosciences instrumentation,** specially the one onboard the RVs as is used at national level*

5. ***Promote the purchase of new instrumentation and/or the development of in-house designed systems**, and collaborate in the selection and development of tools and systems to equip the new Data Processing Lab of the UTM-CSIC*

Progress development & International Collaboration

- 1998: The technology transfer agreement signed with the Bullard Laboratories, Department of Earth Sciences, University of Cambridge (United Kingdom). For construction of minidobs

- New Generations of sensors (OBS) joint project between UPC (Polytechnic University of Catalonia) and UTM-CSIC.

- At present the transfer project of OBS is being developed together with the SARTI group. It is a PETRI Project which is a Project to Encourage the Transfer of Research Results for building a preproduction of OBSs

- In 2007 a MoU agreement with the IGPP/SIO (Scripps Institution of Oceanography)/UCSD (University of California, San Diego) for technologically collaborating on the new developments of OBS's

4.- Technological Development Engineering Service: Objectives

Principal Objectives

- To provide technologically advanced systems to acquire precise information about the variables to be studied, using forefront procedures and technologies.

- To carry out the integrated design (mechanical structure and electronics) with the proper materials to reduce maintenance and simplify the operations.

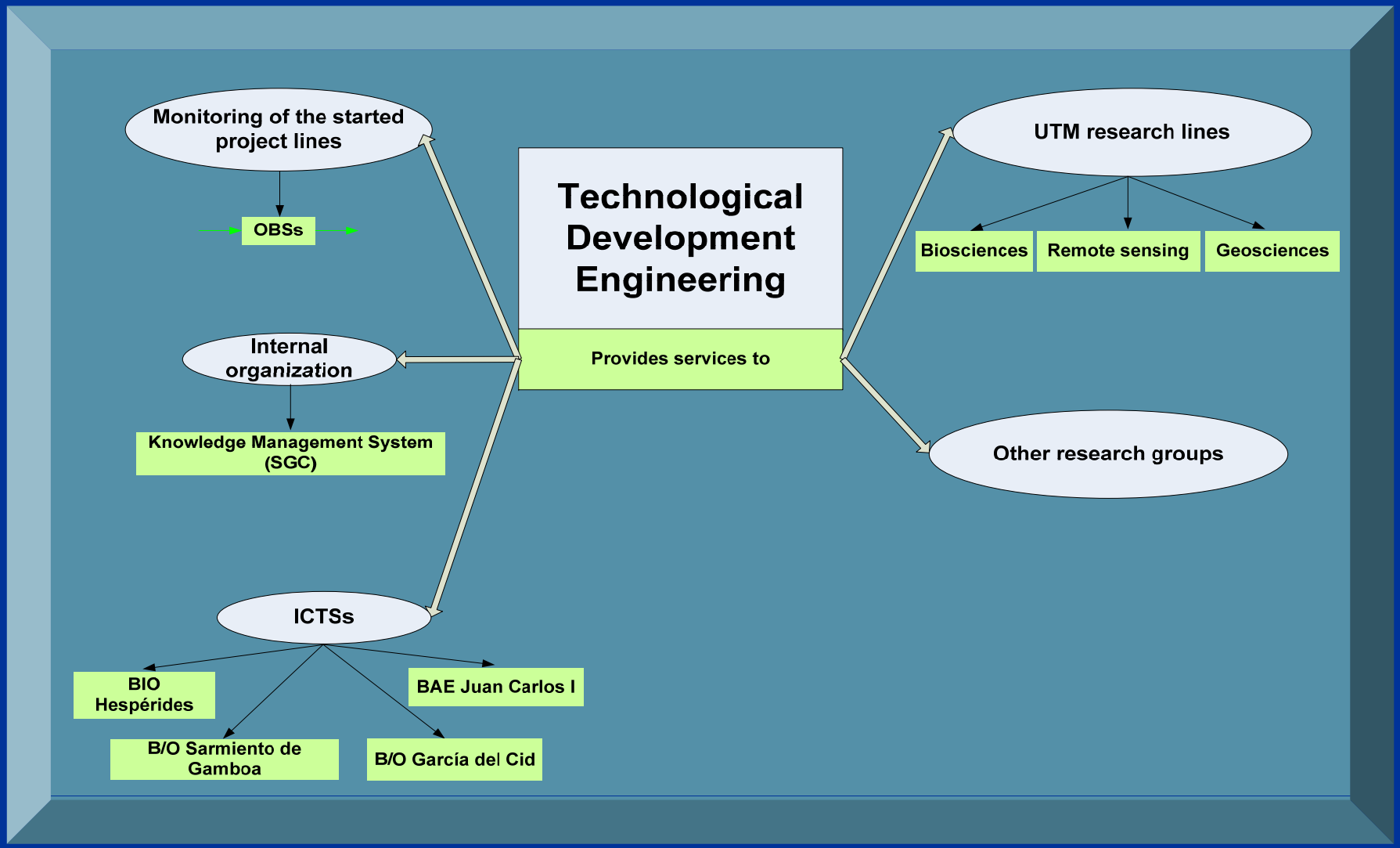
- To design equipments using efficient sensors and acquisition systems for improving the quality of the data stored by the instruments.

- To develop software to control microprocessors and the instruments acquisition systems.

- To use suitable signal processing techniques that allow quality control during the acquisition.

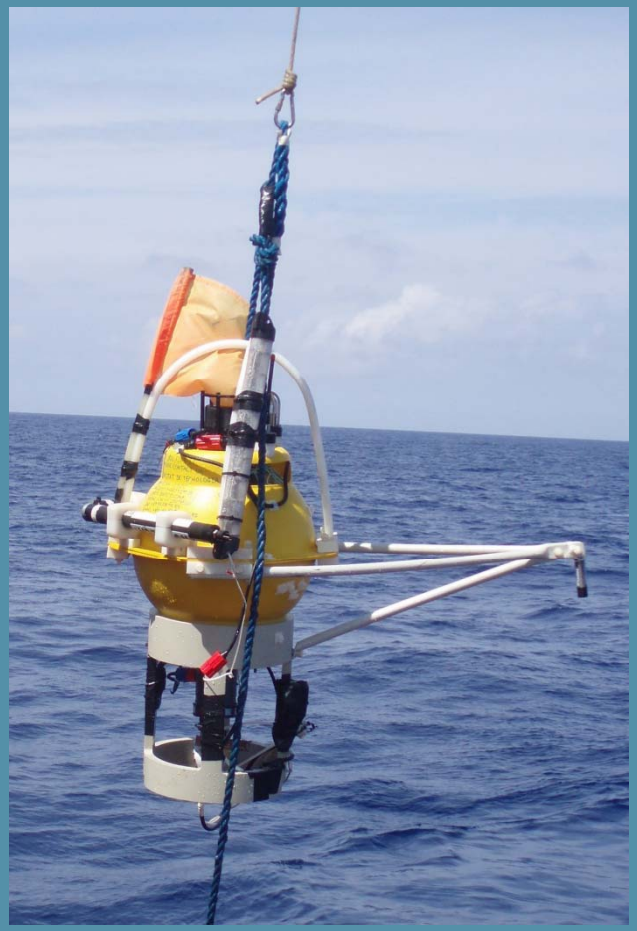
- To adapt technologies already implemented in other scientific fields in the marine instrumentation environment.

Technological Development Engineering Service



Technological Development Engineering Service

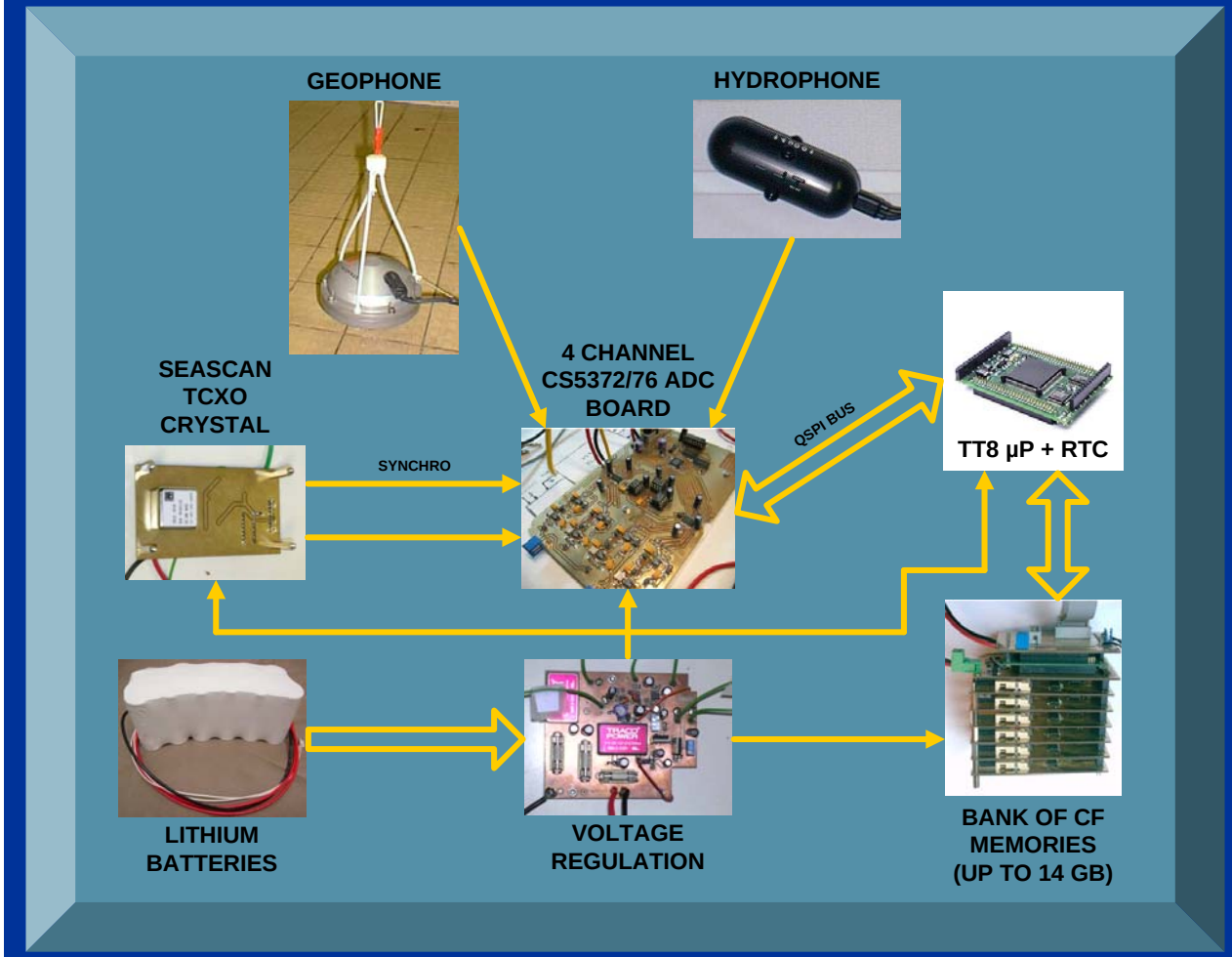
OBS (I) - Related Projects



- ***Design and construction of OBSs (Ocean Bottom Seismometers)***
  [CYTMAR, AE]
- ***Deep Marine Seismometer Trials - OBS***
  [CYTMAR]
- ***New generation of light autonomous underwater sensors (seismometers) - SENSUAL***
  [REN2000-1016]
- ***Signal transmission in the light autonomous underwater sensors - SENSORES***
  [REN2003-08341]
- ***Signal transmission in the light autonomous underwater sensors - SENSUAL***
  [CTM2004-04510]
- ***SENSUAL Oceanographic survey***
  [CM2005-23774]
- ***Depth Marine Seismometer***
  [PETRI]

Technological Development Engineering Service

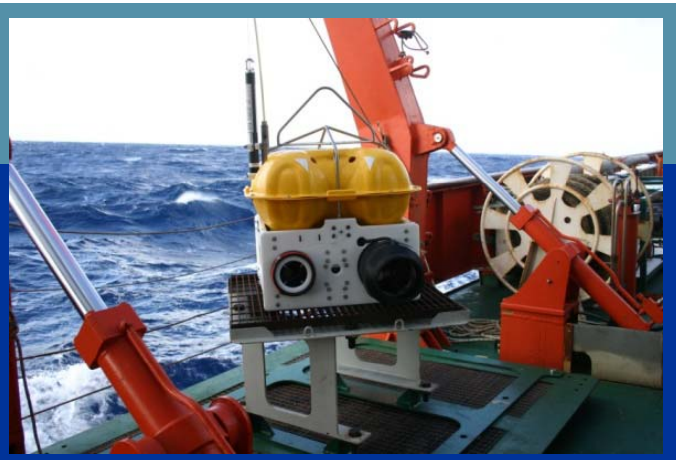
OBS (II) - Innovation, Improvements and Modifications



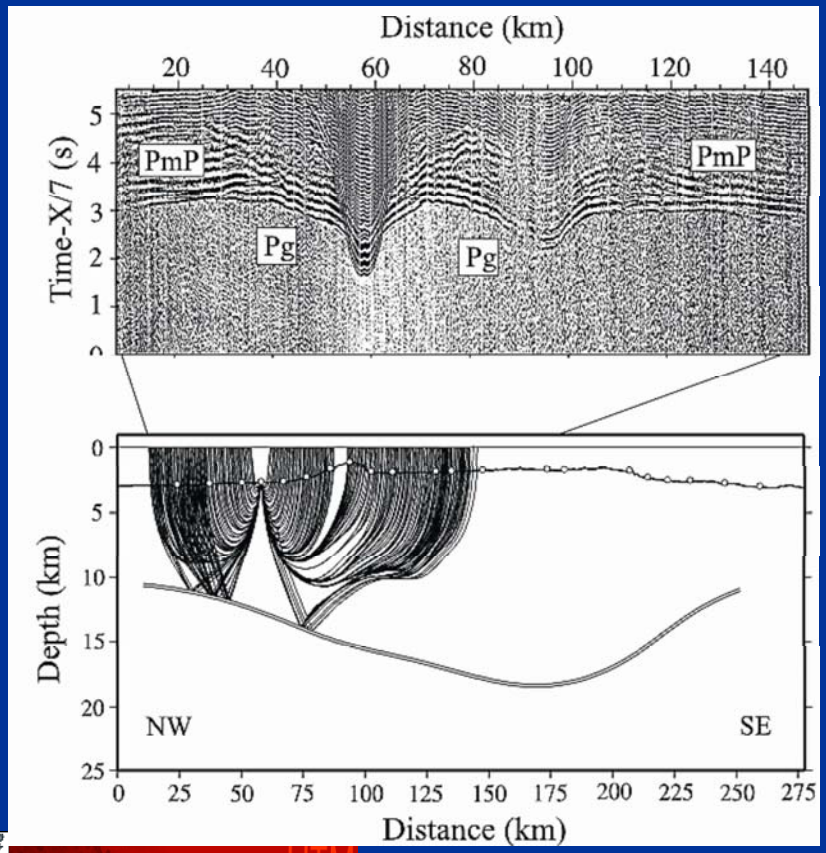
- *Software migration to the Tattletale TT8 environment*
- *Redesign of the ADC board (Crystal CS5372/76) for reducing the acquisition noise*
- *Integration of a refraction seismics standard clock (TCXO Seascan)*
- *Increase of the acquisition autonomy*
- *Integration of a reliable mechanical release*
- *Installation of finding elements*
- *Changes in the external structure*

OBS Instrumentation development: New findings at sea

New UTM OBS at sea: NEAREST-SEIS survey, BIO Hespérides, Nov 2008

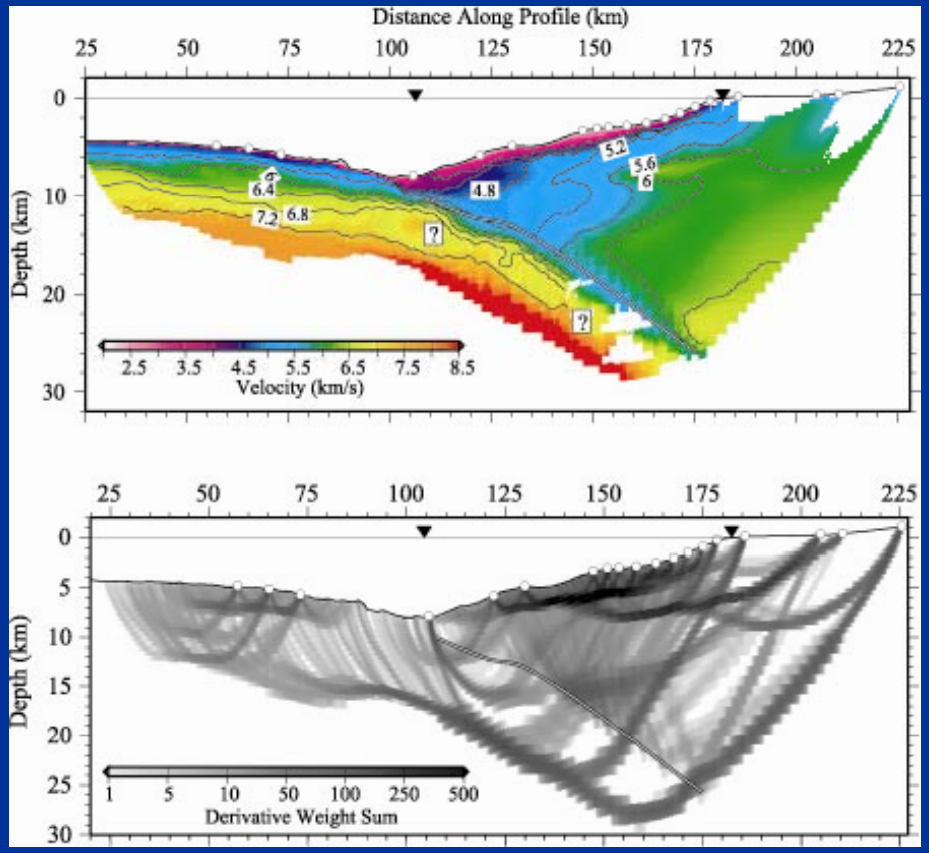


OBS record section offshore Costa Rica



Sallarès et al., JGR, 2003

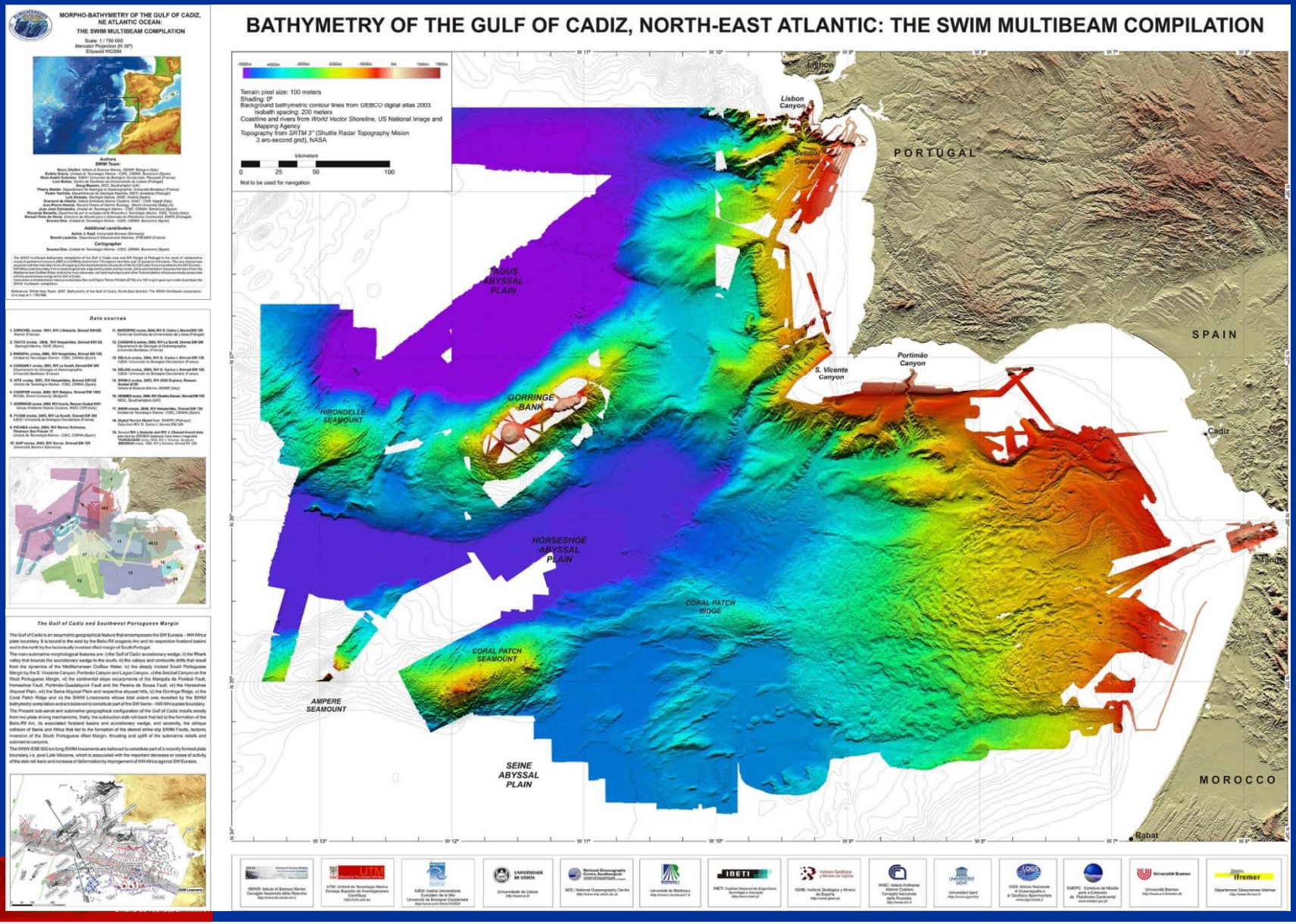
Final velocity model onshore - offshore Chile



Sallarès et al., JGR, 2005

The UTM Processing Lab: A National Service

Swath bathymetry& backscatter processing facility since 2004:



•Diez et al., 2005; Zitellini et al., EPSL 2009

R&D in Marine Geosciences Summary

- **PERSONNEL**
  - Civil servants: 1 Res. professor,1 Res. scientist, 1 Tenured scientist
  - Scientists hired: 1 RyC, 2 JAE postdoc, 1 other
  - Scientists training: 2 JAE predoc, 4 other
  - Technicians: 1 tenured

  TOTAL: 14

- **PROJECTS**

  JJ. Dañobeitia, E. Gràcia & V. Sallarès: PIs of 28 projects (EU, MICINN, CSIC, Regional Gov., industry)

  Topics: seafloor & habitat mapping, structure, nature and properties of the crust and sediments in margins, seismic oceanography, geohazards.

  TOTAL FUNDING (2003-2007): 1.85 M€

- **PUBLICATIONS & CONGRESS PRESENTATIONS**

  SCI publications: 32
  No SCI publications: 7

  TOTAL Publications: 39

  TOTAL National & International Congress abstracts: 146

Computing and Telecommunication Services and Activities

7 Computing and Telecomm Engineers:

- **Technical Support and maintenance** of computing and telecommunication systems of 3 oceanographic ships, 1 Antarctic station and on land UTM staff in Barcelona and Vigo (administration, technical and research departments, data processing services). 720 working days per year at sea/Antarctica.

- **Development of data acquisition** systems, and end user services to access data and corporate information.

- **Design and specification** of new computing systems for new platforms. Technical assessment to other departments in computing systems.

Recent technical development activities

- UTM Intranet system development (Network corporative space and tools: Blog, calendar, document content management, backups, web spaces for upload/download contents)
- BO Sarmiento de Gamboa computing and telecommunication system. Complete development of a 1Gb/s LAN with Intranet User Space and Data Acquisition Services integrated with a Broadband Internet Access.
- BO Hesperides computing and Telecommunication system. Upgrading of the General Purpose Data Acquisition System (SADO) with a main releases of software to work in a WEB scenario Upgrading of user access system, LAN infrastructure and Broadband Internet Access.
- BO Garcia del Cid. Upgrade of General Purpose Data Acquisition System and LAN infrastructure.
- Specification of 3 public tenders to VSAT Satellite Broadband Access for BO Sarmiento de Gamboa, BO Hesperides and BAE Juan Carlos I. Two firsts implemented on 2008.
- GIS infrastructure development to access Real Time Data and Last Year General Purpose Data acquired on board ships.

Satellite Communications

Broadband Satellite Communication based on VSAT systems

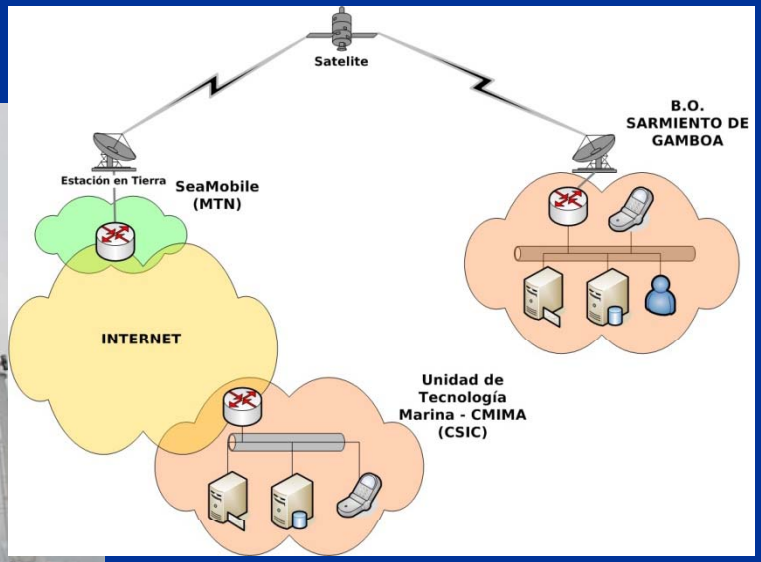
Installations:

- BO Sarmiento de Gamboa: April 2008
- BO Hesperides: August 2008
- BAE Juan Carlos I: Public Tender on September 2008

Benefits to infrastructures:

- Internet Access at 256 kbps to 2Mbps with guaranteed bandwidth to scientist, technician staff and crew. Access to Internet facilities of Universities and Research Centres
- VPN implementation between ships and main UTM site. Real time data acquisition backup and access to corporate facilities.
- Remote control and tele-assistance to ships from on land UTM site.
- Reduction of voice communication costs. VoIP calls RTC to ship calls at local cost.
- Video and data streaming capabilities. Remote scientific participation and demonstration to schools and universities.

Satellite Communications



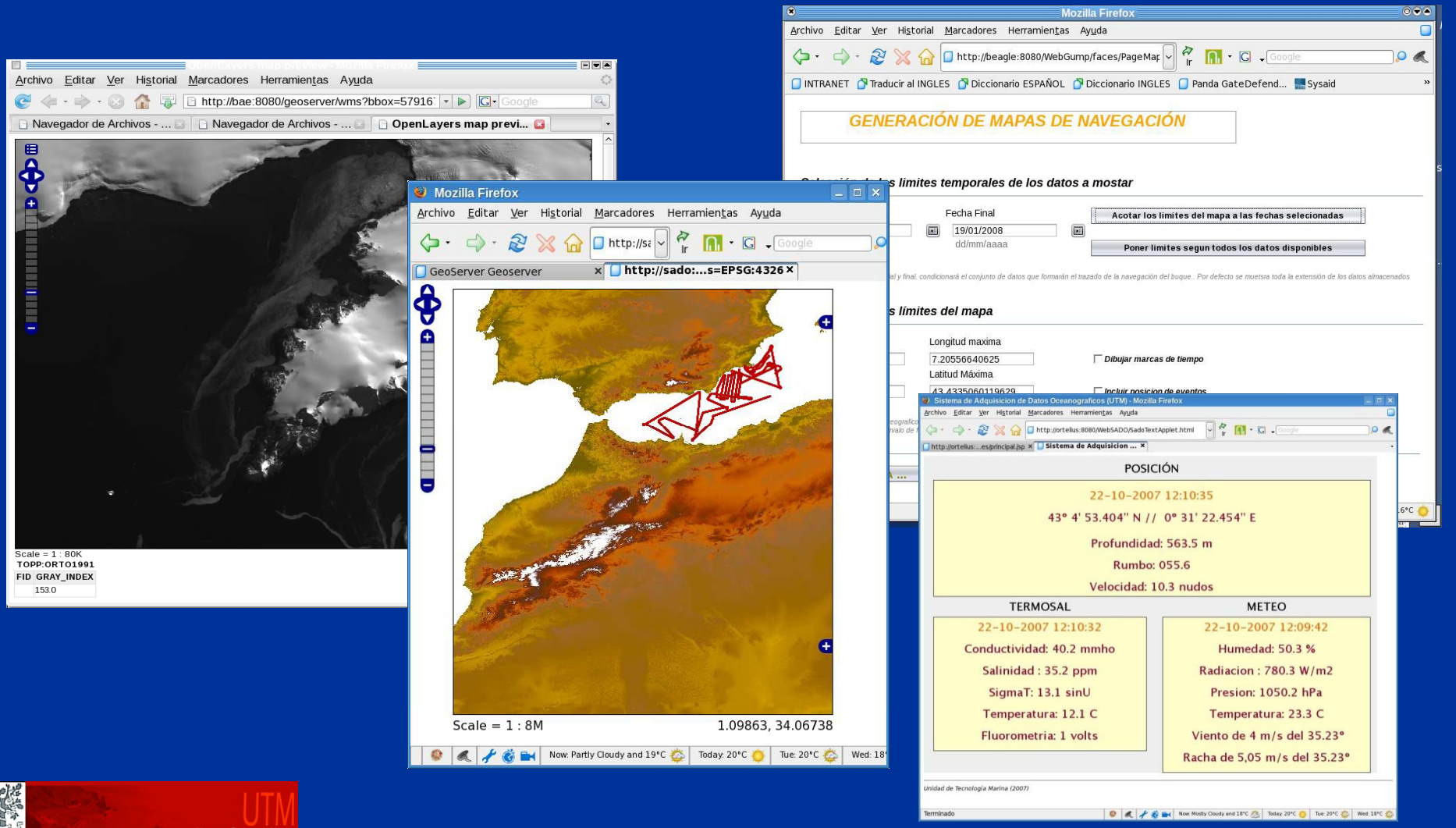
Ship Real Time Monitoring

CSIC

UTM
UNIDAD DE TECNOLOGÍA MARINA

General Purpose On board Data Acquisition System

- **Set of data acquisition, storage and data visualization designed to be used on a WEB (Intranet) scenario**



CSIC UTM Unidad de Tecnología Marina